

## CLAIMS

[1] A fuel cell system comprising:

a hydrogen generator including a reformer configured to generate a hydrogen-rich gas containing carbon monoxide from a fuel containing hydrocarbon and water; a shift converter configured to generate hydrogen and carbon dioxide from the carbon monoxide in the hydrogen-rich gas and the water; and a carbon monoxide removing portion configured to reduce the carbon monoxide in the hydrogen-rich gas which has not been removed in said shift converter;

a fuel cell configured to generate power using the hydrogen-rich gas supplied from said hydrogen generator and an oxidizing gas;

an air supply portion configured to supply air to at least one of a position upstream of said reformer in a flow of the fuel and a position between said carbon monoxide removing portion and said fuel cell in the flow of the fuel; and

an impurity removing means configured to remove an impurity gas from the air.

[2] The fuel cell system according to claim 1, further comprising:

an air supply portion configured to supply air to an upstream side of said reformer in the flow of the fuel; and

an impurity removing means configured to remove a sulfur compound from the air.

[3] The fuel cell system according to claim 1, further comprising:

an air supply portion configured to supply the air to the position between said carbon monoxide removing portion and said fuel cell in the flow of the fuel; and

an impurity removing means configured to remove ammonia, amine, fatty acid, hydrogen sulfide, and aldehyde from the air.

[4] The fuel cell system according to claim 1, wherein said reformer is configured to generate the hydrogen-rich gas containing the carbon monoxide from the fuel containing the hydrocarbon, the water, and the air.

[5] The fuel cell system according to claim 1, wherein said impurity removing means has an adsorbing agent or an absorbing agent of hydrogen sulfide.

[6] The fuel cell system according to claim 1 or 2, wherein said impurity removing means has an adsorbing agent or an absorbing agent of sulfur oxide.

[7] The fuel cell system according to claim 1, wherein said impurity removing means has a catalytic combustor.

[8] The fuel cell system according to claim 6, wherein said impurity removing means has a catalytic combustor located upstream of the adsorbing agent or the absorbing agent of the sulfur oxide in a flow of the air.

[9] The fuel cell system according to claim 7, wherein said catalytic

combustor is positioned to exchange heat with said hydrogen generator or with an exhaust gas resulting from combustion which is used to heat said hydrogen generator.

[10] The fuel cell system according to claim 6, wherein the adsorbing agent or the absorbing agent of the sulfur oxide is positioned to exchange heat with said hydrogen generator or with an exhaust gas resulting from combustion which is used to heat said hydrogen generator.

[11] The fuel cell system according to claim 8, wherein said catalytic combustor functions as the adsorbing agent or the absorbing agent of the sulfur oxide and has a catalyst containing noble metal and alkaline earth metal, said catalytic combustor being positioned to exchange heat with said hydrogen generator or with an exhaust gas resulting from combustion which is used to heat said hydrogen generator.